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ABSTRACT

The contributions of California higher education to the state's economic prosperity and to its social and cultural health are discussed. Direct economic impacts of higher education are reviewed, and the methodology and assumptions employed in economic impact studies are described. Studies by the major segments of California higher education employed the Caffrey-Isaacs methodology, using a cash-flow transactions matrix and expenditure multipliers. The analyses applied to the 1981-1982 year, with attention to the economic impact of the California State University, the University of California, the California community colleges, and California's independent colleges and universities. In analyzing higher education's impact on human capital development, the focus is national and California employment trends, trends in the award of degrees in the different sectors of higher education, and returns on government investment in human capital. The impact of higher education on individual personality and social life is also assessed. Focal areas include: unemployment rates for the civilian labor force by educational level for 1965, 1970, 1975, and 1980; and participation rates for community service programs in California community colleges, 1978-1979. Appended are descriptions of 12 studies of higher education's economic impact. (SW)

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THE WEALTH OF KNOWLEDGE

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CALIFORNIA POSTSECONDARY EDUCATION COMMISSION

HE012 481

The California Postsecondary Education Commission was created by the Legislature and the Governor in 1974 as the successor to the California Coordinating Council for Higher Education in order to coordinate and plan for education in California beyond high school. As a state agency, the Commission is responsible for assuring that the State's resources for postsecondary education are utilized effectively and efficiently; for promoting diversity, innovation, and responsiveness to the needs of students and society; and for advising the Legislature and the Governor on statewide educational policy and funding.

The Commission consists of 15 members. Nine represent the general public, with three each appointed by the Speaker of the Assembly, the Senate Rules Committee, and the Governor. The other six represent the major educational systems of the State.

The Commission holds regular public meetings throughout the year at which it takes action on staff studies and adopts positions on legislative proposals affecting postsecondary education. Further information about the Commission, its meetings, its staff, and its other publications may be obtained from the Commission offices at 1020 Twelfth Street, Sacramento, California 95814; telephone (916) 445-7933.

THE WEALTH OF KNOWLEDGE

Higher Education's Impact on California's Economy

CALIFORNIA POSTSECONDARY EDUCATION COMMISSION

1020 TWELFTH STREET, SACRAMENTO, CALIFORNIA 95814

Commission Report 84-1
Adopted January 30, 1984

THEY [the Americans] have all a lively faith in the perfectibility of man, they judge that the diffusion of knowledge must necessarily be advantageous, and the consequences of ignorance fatal.

Alexis de Tocqueville,
Democracy in America

•

IF you think education is expensive, try ignorance.

Ann Landers, quoted by Howard Bowen in *Investment in Learning*

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INTRODUCTION

THAT Americans have an admiration for, and a belief in the benefits of, education seems beyond serious question. Since the founding of Harvard in 1636, schools, colleges, and universities have proliferated across the United States, all of them founded with the idea that the human condition would somehow be improved through the process of accumulating and transmitting knowledge. So deep does this idea lie in the American consciousness that it led to the creation of almost 3,500 institutions, 14 of them prior to the American Revolution, 26 of them in the remainder of the 1700s, 924 in the 1800s, 1,041 between 1900 and 1950, and 1,296 in the past 30 years alone.

In California, the assumption that education and prosperity are intimately related has been an article of faith. Over the course of two centuries, starting with the founding of the University of Santa Clara and the College (now University) of the Pacific in 1851, the number of higher education institutions has grown to a total of 137 public, 138 accredited independent, and 124 unaccredited private colleges and universities. Throughout its history, the State has invested generously in the educational enterprise, and as a result, the expansion of higher education in California has been even more dramatic than in the nation at large. For example, although Californians make up 10.4 percent of all Americans, its college and university students constitute 14.8 percent of such students nationally; its public colleges and universities enroll 16.9 percent of the nation's public college and university students; and its expenditures for these public institutions amount to 13.4 percent of the nation's total.

There can be little doubt that this impressive commitment to higher education is traceable to California's belief that education is among the State's highest priorities. Yet even among the most ardent advocates of education, few have been able to state with clarity just what higher education has meant to the State economically, what wealth it has created, how it has changed people, and how it has improved the quality of life.

In this report, the California Postsecondary Education Commission offers a perspective on California higher education's contributions to the State's economic prosperity and to its social and cultural health. It seeks to demonstrate in direct and quantifiable terms that higher education is paying its own way -- that the billions of dollars invested in it truly are an investment, and not just a desirable luxury that burdens State and local treasuries. The fact that both the nation and California have recently emerged from the most severe recession in nearly a half century makes it tempting to dwell exclusively on this issue of direct economic benefits -- to show that higher education can help reduce the nagging problems of unemployment, industrial underutilization, trade imbalances, and technological noncompetitiveness. But equally important are education's indirect economic impacts on the State's "human capital" -- the effects higher education has on those who receive its services. If exposure to education produces changes in people, then how can these changes be characterized? Are people who spend a period of years on a campus those who would have succeeded anyway? Is the State over-investing in training that students would seek at their own cost if publicly supported higher education institutions did not exist? Can the research contributions of the professoriate be produced only within a university context, or can they be expected to emerge eventually from corporate research laboratories anyway? Would California with all its natural advantages of geography and climate be as prosperous as it is with a far lower expenditure on education?

To address these issues, this report begins with an overview of higher education's direct contributions to California's economy, not only because those contributions have immediate importance, but also because dollars are more easily measured than the intangibles of human character. Chapter One thus reviews the methodology and assumptions employed in economic impact studies generally and summarizes the specific economic impact of the California State University, the University of California, the California Community Colleges, and California's independent colleges and universities, as calculated by staff and representatives of these institutions. Chapter Two deals with higher education's effect on the labor force, while Chapter Three is concerned with personal and social effects. The idea that people who have been exposed to higher education somehow become better citizens may not seem to have a great deal to do with economic impact, but evidence

presented in this report suggests that well-educated people exhibit greater openness to change, more involvement in public affairs, less dogmatism and intolerance, and greater personal discipline than people with less education. As the fourth and final chapter of the report points out, all these features -- directly or indirectly -- have highly significant economic consequences.

This report stems from a joint project of the Commission and the University of California, the State University, the Community Colleges, and the Association of Independent California Colleges and Universities (AICCU), which grew out of a study proposal first presented to the Commission's Statutory Advisory Committee in September 1982. The Commission is grateful to the segments for their participation in the project, and it is pleased to be able to make copies of their reports from the project available on request along with this report.

CHAPTER ONE

Direct Economic Impacts of Higher Education

IN 1981-82, California's institutions of higher education had a direct economic impact on California of at least $28.3 billion -- an amount that represented about 7.9 percent of California's total gross state product of $360 billion that year. This $28 billion represented only the impact of California's colleges and universities as organizations or industries -- it did not include such factors as the additional wealth produced by the new knowledge they created, the added income generated by graduates and non-graduates, the enhancement of students' skills and talents, or the social and cultural contributions of higher education that, while impossible to quantify, also enriched the quality of life in this State.

Evidence of this economic impact stems from studies conducted over the past year by the California Postsecondary Education Commission and the staff of the four major segments of California higher education -- the California State University, the University of California, the California Community Colleges, and California's independent colleges and universities. These studies indicate that the California State University had a total direct impact on the State of at least $5.1 billion; the University of California, $8.6 billion; the Community Colleges, $6.9 billion; and the independent institutions, $7.7 billion.

The segmental studies resulted from the Commission's concern that higher education has entered another turbulent period -- one marked not by campus unrest and the challenges of growth but instead by retrenchment, declining enrollments, and a nagging and frustrating uncertainty about its role, its future, and its contribution to the welfare of the State and its citizens.

In recent years, books with titles like *The Case Against College*, *Deschooling Society*, and *The Overeducated American* have questioned both the size and purposes of the educational enterprise. Critics of higher education have argued that it no longer deserves as high a social priority, that its benefits are less than generally perceived, and that more students are enrolled in college than can possibly make effective use of the educational services provided. College no longer appears to be the only avenue for upward mobility in American life, now that bus drivers, sanitation workers, and factory workers often make as much as teachers, social workers, and liberal arts graduates. Despite continuing support for higher education from most of the public, questions about the value of education have led to reduced appropriations, declines in faculty real income, cutbacks in student financial aid and research funding, rapid fee increases, and serious threats to both access and quality.

Such periods of change and reconsideration warrant an analysis of basic assumptions: in this case, those about the economic value of higher education for the State and its citizens. Is the State's current investment in higher education really a drain on its treasury -- a pleasant but overly expensive luxury -- or does higher education actually pay its own way by yielding demonstrable economic returns on the State's investment? To answer this question requires an analysis of institutional economic impacts.

ECONOMIC IMPACTS AND "EXPENDITURE MULTIPLIERS"

In the past decade, dozens of economic impact studies have been conducted by various agencies around the country -- the most important of which are summarized in the Appendix on pages 29-33. Most all of them owe their statistical viability to a single effort: that of John Caffrey and Herbert H. Isaacs, who, working under the auspices of the American Council on Education, in 1971 published a report entitled *Estimating the Impact of a College or University on the Local Economy*. In the foreword to that report, Logan Wilson, then president of the Council, noted that until recently:

> Town-and-gown relationships were frequently characterized by hostility on the one side and aloofness on the other. With the growth of higher education's importance to society, this relationship in most places, fortunately, has undergone a marked change. Unfortunately, however, the mutuality of interests is still not widely

understood and as fully appreciated as it ought to be. The purpose of this publication is to provide a better basis for understanding one set of relationships between the campus and the surrounding community.

To that end, Caffrey and Isaacs developed the cash-flow transactions matrix pictured in Table 1 below. By measuring cash flow in each cell of the matrix and by applying various "economic multipliers," they were able to calculate a final impact figure that represented the amount of money a particular college or university was worth to the community or locality in which it is located -- that is, the total number of dollars that would not be in the community if the campus wasn't there.

The key to the Caffrey-Isaacs study and to subsequent economic impact studies is the establishment of the "expenditure multiplier." This concept is based on the widely accepted economic principle of exchange that when money is spent for some purpose, it does not simply disappear: part of it remains in the community to be spent and respent again and again. The part that is removed from the immediate area may depart in the form of taxes, payment to citizens of another locale, purchases outside the area, vacation spending by residents who travel elsewhere, or by other means. In most cases, however, several exchanges are involved before it vanishes from the scene. For example, if half a dollar leaves a community at the first transaction, and half of the remainder leaves at the second, 25¢ will still be left in the community from the original dollar.

TABLE 1 An Extended Cash Flow Transactions Matrix

FROM: \ TO:	College	Business	Government	Household: Student	Household: Faculty / Staff	Household: Community
College		Purchases	Taxes, in-lieu fees, purchases	Stipends, grants, loans, wages	Wagers, loans	
Business	Gifts, contracts, endowments, income		Taxes, fees	Wages, profits	Wages, profits	Wages, profits
Government	Support, Contracts	Purchases		Wages, transfers	Wages, transfers	Wages, profits
Household: Student	Tuition, fees, purchases	Purchases	Taxes, fees			
Household: Faculty / Staff	Fees, purchases	Purchases	Taxes, fees			
Household: Community	Fees, purchases	Purchases	Taxes, fees			

Source: Caffrey and Issacs, 1971, p. 8.

Before its value drops below a penny, five more transactions will have occurred, and all of them taken together will generate another dollar of economic activity in the community. This 50-percent retention rate produces an expenditure multiplier of 2.00. Table 2 and Figure 1 show the effects of various retention rates on multiplier levels. As can be seen, the range of multipliers is from 1.00 (no multiplication of economic benefits, when the dollar spent is totally removed from the area under study) to infinity, when the area in question is totally self contained and no resources ever leave it. Also obvious is the rapid increase of the multiplier when the retention rate exceeds 50 percent.

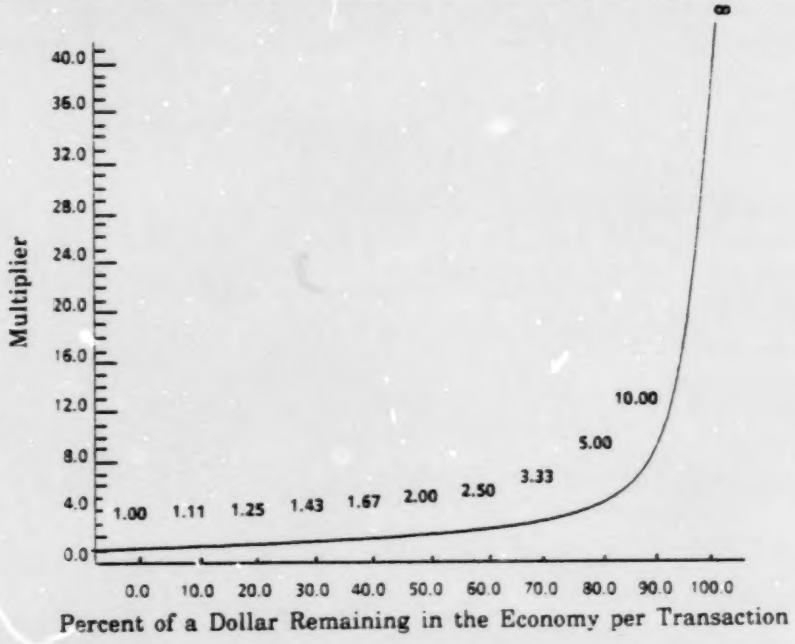
One of the major principles of multipliers is that the larger or more self-contained the area in which money is spent, the greater will be the percentage retained, the more it will turn over, and the larger the multiplier will be. The ultimate example is a desert island with no contact with the rest of the world. A dollar spent there would have an infinite multiplier. Similarly, a dollar spent in the United States has a very large multiplier because the country is so large. Individual states have smaller multipliers that vary greatly by state. For example, a small east-

TABLE 2 Relationship Between the Percentage of an Expended Dollar Remaining in the Economy after Each Financial Transaction and the Resulting Economic Multiplier

Percentage of Each Expended Dollar Remaining in the Economy	Economic Multiplier
0.0%	1.00
10.0	1.11
20.0	1.25
30.0	1.43
40.0	1.67
50.0	2.00
60.0	2.50
70.0	3.33
80.0	5.00
90.0	10.00
100.0	Infinite

Source: Commission staff analysis.

FIGURE 1 Relationship Between the Percentage of an Expended Dollar Remaining in the Economy after Each Financial Transaction and the Resulting Economic Multiplier



Source: Table 2.

ern state such as Delaware, with a large nonindigenous work force, has a smaller multiplier than a relatively isolated state such as California, where few out-of-state residents are employed.

In their 1971 study, Caffrey and Isaacs employed the following multipliers, which varied, as can be seen from Table 3, with the locality:

TABLE 3 A Partial Listing of Expenditure Multipliers Developed by Caffrey and Isaacs

Location or Area of Study	Expenditure Multiplier
Lancaster County, Nebraska	2.3
Los Angeles County, California	2.2
Wichita, Kansas	2.0
Portsmouth-Dover Area, New Hampshire *(Multiplier based on Pease Air Force Base expenditures only)*	1.2 to 1.4
Hawaii	1.3
Ayer, Massachusetts *(A small semi-rural town near a large military installation)*	1.2

Source: Caffrey and Issacs, 1971.

Obviously, the larger the area (and the greater the population of that area), the greater the number of opportunities for dollar turnover and the larger the resultant multiplier. Accordingly, a state may have a multiplier of 2.5 or 3.0 or more. In California's case, because of its relative isolation, its multiplier is certainly in the upper range and may be as high as 3.5.

When the Commission and California's segments agreed to study the impact of higher education on California's economy, they all agreed that the Caffrey-Isaacs methodology provided the best theoretical and analytical basis for the segmental studies, if it was refined to tailor it to California's distinctive economy. At the outset, three basic assumptions were accepted:

1. The analyses should be conservative in estimating the segments' economic impact, rather than overestimating impact. Thus, even though Caffrey and Isaacs believed that their own estimates of impact were on the conservative side, the segments have all employed multipliers of less than 3.0. The State University employed the lowest, 2.37; the Community Colleges and independent institutions both used 2.5; and the University of California adopted 2.78. As Caffrey and Isaacs stated (1971, p. 4), although "actual economic impacts are probably greater than the models suggest, . . .it seems better to err on the side of too little than too much, particularly when a public relations function is being served and it is impractical to account for all the real expenditures of every individual and group associated with the college."

2. All of the analyses would apply to the 1981-82 year despite the fact that most data for 1982-83 would be available by the time the report was released. The earlier year was chosen in order to obtain the most comprehensive array of data and because net economic impact does not differ markedly from year to year.

3. Certain economic factors would be assumed to have neutral or canceling effects. For example, real estate taxes foregone by a community due to the existence of a campus are typically offset by the fact that real estate assessed values tend to be higher for land adjacent to campuses. Similarly, the loss of income to a community caused by educating the children of faculty in the public schools is offset by the fact that these children would have to be educated somewhere, whether or not their parents were academicians, and also by the added income to the community caused by the campus's presence. Despite these commonalities, each segment was free to conduct its own study in its own way in order to show its unique contribution to California's economic and social well-being. Each contributes to the State's economy in different ways, and accordingly, their reports differ in approach as well as content. The California State University, for example, developed a comprehensive econometric model for its report and included in the document two separate analyses of human capital development. In contrast, the University of California emphasized in its report the effect of its extensive research contributions on the economy, the Community Colleges identified the

many special programs it offers for job training and retraining; and the Association of Independent California Colleges and Universities included case studies of three of its most widely known members: the California Institute of Technology, Stanford University, and the University of Southern California.

THE CALIFORNIA STATE UNIVERSITY

The economic impact study conducted by the Chancellor's Office of the State University -- not only the most detailed of the four segmental studies but also the only one based on comprehesive econometric models -- concludes that in 1981-82, direct expenditures of the State University, its faculty, staff, students, and visitors, amounted to $2.1 billion, which generated over $2.9 billion in business activity, as shown in Table 4 below, for a total direct impact on California's economy of $5.1 billion.

The State University calculates that an additional 191,629 jobs were created in 1981-82 throughout California as a direct result of its operations -- for example, in businesses that serve the University and its personnel in one way or another. If the taxes of these workers are added to those of the State University's personnel listed in Table 5 on page 8, the total might well be greater than the nearly $1 billion that the State appropriated to the State University in 1981-82. Due to the impossibility of evaluating the contributions of those workers precisely, this assertion cannot be made categorically, but it appears to be a strong likelihood.

The Chancellor's Office sought to estimate the costs to State and local government of State University operations beyond this State appropriation. To do so, it supplied various cost estimates based on a straight population share that the State University community occupies in relation to the total State population. For example, it assigned costs for legislative representation, correctional activity, health and welfare, and other State operations, regardless of how little some of these services are actually used in practice by faculty and staff members who are historically self sufficient.

Its estimate for all of these costs to State and local governments is $597 million, which is almost certainly overestimated. Even when these costs are added to the State appropriation (an addition which raises the total cost to $1,559 million), it is not unreasonable to assume that the State University, while not a self-supporting enterprise strictly on the basis of its activities as an industry, returns a very substantial amount of the cost.

TABLE 4 Economic Impact of California State University Expenditures, 1981-82

Source of Expenditure	Direct Expenditures	Added Impact of Multiplier	Total Economic Impact
Institution	$ 313,040,618	$ 428,865,647	$ 741,906,260
Faculty and Staff	581,597,858	796,789,065	1,378,386,923
Students	1,237,322,626	1,605,131,997	2,932,454,623
Visitors	28,000,000	38,360,000	66,360,000
Total	$2,159,961,102	$2,959,146,709	$5,119,107,811

Source: California State University, 1983, p. 115.

UNIVERSITY OF CALIFORNIA

The University of California computes its direct impact on California's economy at $8.65 billion, based on a multiplier of 2.78 and only two categories of expenditure -- those of University purchases of goods and services, and of expenditures by University employees (Table 6 on page 9). Excluded from its total are out-of-state visitor expenditures. Also not included in the total -- as was true for the State University as well -- are the value of business property committed to University-related business, expansion of the credit base of such financial institutions as banks and savings and loan associations, and real estate taxes paid and foregone.

The University calculated that its students spent an additional $735 million, excluding room and board in University dormitories; but unlike the State University, it has not included these expenditures in its total because it assumes that these young people, most of them California residents, would have spent an equivalent amount of money even if they were not students.

The University estimates that approximately 308,000 jobs were created within California as a direct result of its presence, most of them due to

TABLE 5 State and Local Estimated Receipts Realized by the Direct and Indirect Activities of the California State University, 1981-82

Type of Revenue	Amount
Real Estate Taxes Paid by Faculty, Staff, Students, and Local Businesses	$ 93,755,145
Personal Property Taxes Paid to Local Governments by Local Businesses	3,561,592
Sales Tax Revenues Received by Local Governments as a Result of State University-Related Purchases	25,647,845
State Aid to Public Schools Allocable to the Presence of the State University	(64,527,340)*
Other Local Government Revenues (including tax relief funds; and license, fuel, registration, cigarette, and related fees)	36,173,866
Revenues Received by the State Government (includes sales, personal income, insurance, cigarette, transit, and alcohol taxes plus various fees)	199,106,431
Revenue from Self-Support Activities, Federal Trust Funds, and Miscellaneous Activities	98,526,662
Revenue from Student Fees and Charges	174,288,400
Total	$631,059,941

*Not included in the total since it is part of Item 6 -- "State Revenues"

Source: California State University, 1983, p. 111 ff.

TABLE 6 Economic Impact of University of California Expenditures, 1981-82

Source of Expenditure	Direct Expenditures	Added Impact of Multiplier	Total Economic Impact
Institution	$1,970,000,000	$3,506,600,000	$5,476,600,000
Employees	1,140,000,000	2,029,200,000	3,169,200,000
Total	$3,110,000,000	$5,535,800,000	$8,645,800,000

Source: Adapted from University of California, 1983, p. 115.

University institutional and personnel spending. Only about 30 percent of the University's budget is derived from State sources, as Table 7 below shows. Nearly 40 percent comes from the federal government, and 20 percent comes from University sales and services. It is clear from Table 7 that the State's investment in the University has created an institution which attracts resources from a wide variety of areas. Even excluding the $1.165 billion for the University's laboratories financed by the Federal Department of Energy, the University attracted $2.8 billion in federal funds, tuition and fees (including out-of-state and foreign student tuition), and private sources (including sales and services, principally but not exclusively from teaching hospitals) in 1981-82 alone -- about two-and-one-third times the amount provided by the State. The impact of these funds on the State's economy is obviously substantial.

TABLE 7 University of California Budget by Source of Funds, by Dollar Amount, and by Percentage, 1981-82

Source of Funds	Dollar Amount (millions)	Percentage
State of California	$1,230.6	29.9%
United States	1,613.2	39.2
Student Fees and Tuition	190.6	4.6
Sales and Services:		
Teaching Hospitals	530.6	12.9
Educational Activities	161.7	4.0
Auxiliary Enterprises	153.2	3.8
Private Gifts, Grants, and Contracts	93.8	2.3
Endowments	63.0	1.5
Local Government	25.1	0.1
Other Sources	55.2	1.4
Total	$4,117.1	99.7%*

* Does not add to 100.0 percent due to rounding.

Source: University of California, 1983, Appendix C.

CALIFORNIA COMMUNITY COLLEGES

The California Community Colleges are the largest system of publicly supported higher education in the United States, serving about 1.5 million students annually, employing some 64,000 personnel, and operating on a total budget of about $1.8 billion from State, local, and federal sources. Their curriculum included 97,000 credit and 13,000 noncredit courses in 1981-82, plus an additional 6,000 community service classes. Physically, the system includes 42 million square feet of space and 60,000 rooms in 3,500 structures on campuses. The replacement value of these structures is estimated at $5 billion.

Using the Controller's report for 1981-82, the Chancellor's Office of the Community Colleges estimated total spending by Community College campuses, faculty, staff, and students at over $2.7 billion. Based on a 2.5 multiplier, the business volume generated by this spending added an additional $4.1 billion to the State's economy, for a total impact of $6.9 billion (Table 8 below).

The Chancellor's Office calculated further that Community College operations led to the creation of 193,000 jobs in California during 1981-82 -- at least 121,000 of them outside the system itself.

TABLE 8 Economic Impact of California Community College Expenditures, 1981-82

Source of Expenditure	Direct Expenditures	Added Impact of Multiplier	Total Economic Impact
Institutional	$ 218,511,081	$ 4[illegible],766,621	$ 769,227,702
Faculty and Staff	1,401,662,096	2,102,493,144	3,504,155,240
Students	1,043,394,660	1,565,091,990	2,680,486,650
Total	$2,763,562,837	$4,145,351,755	$6,909,919,592

Source: Chancellor's Office, California Community Colleges, 1983, p. 3.

INDEPENDENT COLLEGES AND UNIVERSITIES

The 60 member institutions of the Association of Independent California Colleges and Universities are all accredited by the Western Association of Schools and Colleges. Included among them are colleges and universities of every conceiveable size and description, including highly selective liberal arts colleges, specialized professional institutes, and innovative centers designed to serve working adults. In 1981-82, their total institutional expenditures were $2.25 billion, of which $58 million or 2.6 percent came from the State of California through student financial aid. The Association estimates the total economic impact from directly identifiable expenditures of the 60 institutions at $7.73 billion, as shown in Table 9 on page 11.

To illustrate the economic impact of its members, the Association asked three major institutions -- the California Institute of Technology, Stanford University, and the University of Southern California -- to calculate their expenditures for its report.

California Institute of Technology: Caltech was founded in 1891 and remains to this day a small school with only 1,748 students and 790 faculty who are engaged in the fields of biology; chemistry; engineering and applied science; geo-

logical and planetary science; physics, mathematics, and astronomy; as well as the humanities and social sciences. It operates the internationally famous Jet Propulsion Laboratory for the National Aeronautics and Space Administration (NASA) as well as the Palomar Observatory in San Diego County. Including its observatories and laboratories, it drew a total of $435 million in out-of-state support in 1981-82, most of it from the federal government, and all of which had a considerable impact on California's economy. In addition, it had an annual budget of about $100 million for instruction, research, and related activities. Visitors attracted to its operations spent an estimated $10.1 million during the year. All in all, total expenditures attributable to Caltech and its employees, students, and visitors came to over $496 million in 1981-82.

Stanford University: Although by the standards of modern universities, Stanford has a relatively small student population of only 12,292, its impact on California's economy is disproportionately large. A very strong case can be made that "Silicon Valley" would not exist today were it not for Stanford, since hundreds of high-technology corporations trace their origins and success to Stanford training and research. In 1981-82, Stanford employed some 10,000 individuals, 1,200 of them faculty, and its budget stood at $406.6 million, of which $143 million was devoted to Stanford's hospital. When faculty income from consulting and research and student and visitor expenditures are added to this budget, its total direct economic impact on California probably exceeded $1.6 billion.

The University of Southern California: USC is the largest of the three independent universities discussed here, with 27,647 students, 1,500 faculty, and 5,800 other employees as of 1981. Its institutional budget for 1981-82 was $348.8 million, part of which came from outside California, such as $71.4 million in federal funds and an additional $91.3 million in tuition, fees, and other expenses from out-of-state and foreign students. Visitors to USC that year are estimated to have spent $7.6 million on sporting and cultural events, conferences, and special events. In 1981-82, the total of institutional expenditures, faculty outside income, student and visitor expenditures, and investments and deposits in businesses and financial institutions, came to $506.6 million. A reasonable multiplier would raise its net impact to well over a billion dollars a year, without accounting for the economic and social contributions of its graduates, who now number 156,000.

The Association of Independent California Colleges and Universities calculates that, taken together, the 60 member institutions of California's independent sector of higher education rank as California's twentieth largest private industry, based on their gross expenditures. Based on their number of employees, they are exceeded only by the Bank of America, Pacific Telephone, and Lockheed.

TABLE 9 Economic Impact of 60 Independent California Colleges and Universities, 1981-82

Source of Expenditure	Direct Expenditures	Added Impact of Multiplier	Total Economic Impact
Institutional *(less payroll)*	$1,367,700,000	$2,051,550,000	$3,419,250,000
Faculty and Staff	879,700,000	1,319,550,000	2,199,250,000
Students	789,700,000	1,184,550,000	1,974,250,000
Visitors	54,700,000	82,050,000	136,750,000
Total	$3,091,800,000	$4,637,700,000	$7,729,500,000

Source: Adapted from Association of Independent Colleges and Universities, 1983, p. 11.

CONCLUSION

The $28.3 billion impact of California's four segments of higher education on the State's economy, discussed in this chapter, represents only their direct impact as employers of people and users of resoures. It includes neither the added income produced by faculty research, graduates, and former students, nor the social contributions they make to the quality of life in the State. In many ways, this direct impact is less important to the prosperity of California than the more indirect and often intangible effects. These latter benefits, which derive from their stimulus to individual talent, have enormous effects on the State's standard of living and are the subject of the following two chapters.

CHAPTER TWO

Higher Education's Impact on Human Capital Development

IN a landmark study published in 1974, Edward F. Denison of the Brookings Institution isolated six principal causes of American economic growth between 1929 and 1969 -- a 40-year period in which national income increased almost fourfold in constant dollars. Among these factors were "advances in knowledge," which accounted for 31.1 percent of the increase, and "increased education of the work force," which accounted for 14.1 percent more. These two education-related factors represented a total of 45.2 percent of the increased productivity. Other factors included the increased size of the work force, increased capital, improvements in the allocations of resources -- principally the movement of surplus labor from the farm to urban areas -- and miscellaneous causes.

Over the past two decades, the economic importance of skills and knowledge has been increasingly recognized, and many economists have called these factors "human capital" -- assets, like financial capital and physical belongings, in which investments often yield large dividends. In 1981, for example, Americans invested some $174 billion in elementary, secondary, and higher education; but according to Denison's calculations, education accounted for about $250 billion of the nation's total income of $2,353 billion that year -- and advances in knowledge associated with education and research accounted for $540 billion more. The costs of schooling thus came to only 22 percent of the estimated productivity that stemmed from education and research.

These past two decades have witnessed spectacular growth in three areas of human capital development outside of the traditional academic education system: technical schools, corporate inservice training centers, and the military services. But colleges and universities remain America's major source of human capital development for highly skilled occupations and the professions, and it is noteworthy that those occupations and professions already comprise a majority share of the national work force, and that their share is increasing. In fact, those occupations requiring a baccalaureate or higher degree are growing faster than those that do not. By 1990, workers with only a high school education or less may be limited to employment that is not only low paying but is also in a sector of the economy that is not growing as rapidly as others.

NATIONAL AND CALIFORNIA EMPLOYMENT TRENDS

According to the U.S. Department of Labor, "Although employment is growing in virtually all sectors of the economy, growth has been much more rapid in service-producing industries than in goods-producing industries" (Personick, 1982, p. 1). By "service-producing industries," the Department of Labor means a variety of services such as business; health and medical care; legal, financial, and personal services; communications; and repair. These service industries range from accounting to hotel administration, from insurance to teaching, and from business services to the entertainment industry. Since 1960, they have employed a steadily increasing share of American workers and have accounted for about two-thirds of the nation's employment growth. They also comprise the sector of the economy that employs the most college and university graduates.

Forecasting employment growth through 1990 in 340 separate occupations, the Department of Labor predicts that those occupations slated for the greatest growth are generally those that require some level of education beyond high school. Table 10 on page 14 lists the 30 occupations expected to grow the fastest through the remainder of the 1980s over their 1978 level, along with an indication of the level of education they normally require. As can be seen, the only occupations included among the 30 that do not require any postsecondary education are food preparation -- service in fast food restaurants, and child care attendants. In contrast, 12 of the 30 normally require a bachelor's or higher degree, and the remaining 16 require some education beyond high school.

What is true of national trends is even more true of California. During the 1970s, the industries

TABLE 10 Number of Jobs and Rates of Growth for the 30 Fastest Growing Occupations in the United States, 1978 - 1990

Code*	Occupation	Number of Jobs (in thousands) 1978	1990	Percent Change
2	Data Processing Machine Mechanics	63	156	147.6%
2	Paralegal Personnel	28	66	135.7
3	Computer Systems Analysts	185	384	107.6
2	Computer Operators	169	317	87.6
2	Office Machine and Cash Register Servicers	49	89	81.6
3	Computer Programmers	204	354	73.5
3	Aero-Astronautical Engineers	57	98	71.9
1	Food Preparation and Service Workers, Fast Food Restaurants	714	1,206	68.9
2	Employment Interviewers	51	86	68.6
2	Tax Preparers	29	47	62.1
3	Architects	66	106	60.6
2	Correction Officials and Jailers	95	152	60.0
2	Dental Hygienists	53	84	57.9
2	Physical Therapists	31	49	57.6
2	Dental Assistants	123	193	57.5
2	Peripheral EDP Equipment Operators	46	72	57.3
1	Child Care Attendants	35	55	56.3
3	Veterinarians	30	47	56.1
2	Travel Agents and Accommodations Appraisers	45	70	55.6
2	Nurses' Aides and Orderlies	1,089	1,683	54.6
3	Speech and Hearing Clinicians	34	52	54.5
3	Economists	27	41	54.2
2	Real Estate Agents and Representatives	255	394	54.1
3	Geologists	33	50	52.1
3	Insurance Claims Examiners	38	58	51.5
3	Electrical Engineers	291	441	51.2
2	Welfare Service Aides	84	126	51.1
3	Professional Nurses	1,026	1,542	50.3
3	Dieticians	41	61	49.7
2	Psychiatric Aides	77	115	49.5

* 1. No postsecondary education normally required.
2. Some postsecondary education normally required.
3. Baccalaureate degree or higher normally required.

Source: U.S. Department of Labor, 1982, pp. 42-45.

that grew fastest in California were construction; trade; finance, insurance, and real estate; and services. But according to the Center for the Continuing Study of the California Economy, during the 1980s, services are likely to grow the most, followed by construction and trade. As Table 11 below shows, by 1990 the service sector is forecast to surpass both manufacturing and trade in its percent of total California employment. California's Employment Development Department (1982, p. 56) anticipates that between 1980 and 1985 the greatest growth among 40 individual job categories will occur in computer specialties (25.1%); health technology (23.2%); food service (21.6%); purchasing, sales, and loan representation (20.7%); engineering (19.5%); health services (19.4%); writing, art, and entertainment (19.3%); and medical workers above the technician level (18.8%).

According to the Department, 19.3 percent of all new jobs in the State between 1980 and 1985 will require a baccalaureate or higher degree, and 43.6 percent will require at least some post-secondary education. Only the remaining 37.1 percent are likely to be open to people with a high school education or less. Even within the manufacturing sector of the economy, some post-secondary education will increasingly be required as California shifts to "high-technology" production of communication equipment, computers, computer services, instruments, and electronic components. This area of manufacturing increased in California by 219,200 workers or 80.3 percent between 1970 and 1980 -- up from 273,000 to 492,200 jobs. By 1990, it is expected to increase by 23.4 percent more through the creation of 234,500 additional jobs.

In the past, California has proven very successful in attracting new industry that has contributed greatly to its overall prosperity. In analyzing the reasons for California's success, the Center has noted (1982, p. 39):

> Regions compete for basic industry jobs on the basis of a variety of location determinants including labor force skills and availability, wage rates, tax rates, transportation costs, energy prices, land costs, housing prices and supply, and lifestyle amenities. California appears to have great attractiveness in three major areas: (1) the state possesses a large and well trained labor force; (2) California has geographic advantages in serving western states and Pacific Basin markets; and (3) amenities in the state are generally rated superior to those of most regions of the United States. (1982, p. 39).

Currently, California, as well as the nation at large, is finding that its products of heavy industry are being undersold by developing nations who have borrowed American technology (and often financial capital) and matched it with lower labor costs than American corporations are able to pay. In contrast, California's strongest export markets both at home and abroad are in areas where knowledge and the quality of labor are more important than the amount of la-

TABLE 11 Growth of California Jobs by Major Industrial Sector, 1980-1990

Industry	Percent Growth	Percentage Share of Total	
		1980	1990
Services	40.4%	15.8%	21.5%
Construction	38.4	3.8	4.3
Trade	28.7	19.1	21.0
Finance, Insurance, and Real Estate	28.0	4.7	5.7
Manufacturing	23.8	19.4	17.8
Transportation, Public Utilities	23.5	5.7	4.8
Mining	21.0	0.4	0.4
Self-Employed, Household Workers	15.6	9.9	8.0
Government	10.6	17.7	14.0
Agriculture	-7.3	3.5	2.6
Total Jobs	24.9%	100.0%	100.0%

Source: Center for the Continuing Study of the California Economy, 1982, p. 54.

bor. Its colleges and universities are the source of much of this knowledge and skill.

THE CALIFORNIA STATE UNIVERSITY

Since its inception as a system, the California State University has awarded over one million bachelor's degrees. Between 1960 and 1981, it awarded 700,868 of these degrees -- over half of all those awarded in the State -- as well as 139,701 master's degrees -- one-third of all of the State's fifth-year degrees. In addition, it has enrolled hundreds of thousands of students who did not graduate or who participated in continuing education. All in all, since 1960, some 2.5 million of California's 24 million residents -- or over 10 percent of the State's population -- have studied at the State University.

Although originally formed to prepare teachers, the State University's campuses now offer programs over the whole range of contemporary occupations, including business and public administration, computer sciences, criminal justice, engineering, nursing, and social work. In 1981-82, out of the 53,466 degrees that it awarded, 12,547 were in various specialties of business and 3,766 were in engineering, compared to 6,042 in education. Even though it grants few doctorates, and those only in cooperation with the University of California or the Claremont Graduate School, over 6,000 of its graduates have gone on to earn the Ph.D.

According to a recent study of science and engineering faculty in the State University, these faculty maintain a close and mutually beneficial relationship with local firms. Because of the geographically diverse location of its 19 campuses, these faculty members are able to provide expert scientific and engineering advice throughout the State, as well as apply the findings of research that they undertake as part of their teaching responsibility.

UNIVERSITY OF CALIFORNIA

In 1981-82, the University of California conferred 30,519 degrees -- 66.3 percent of them at the undergraduate level, and 33.7 percent at the graduate level and in professional fields. Half of these degrees were in business and technical subjects -- 3,881 of them in engineering and computer science, 2,205 in the health professions, and 1,872 in business. In addition, the University's totally self-supporting program of University Extension offered 10,108 courses that attracted 370,000 registrations, many of them in continuing education for high technology specialties and the professions. Students in these extension courses paid $61.2 million in fees (accounting for two-thirds of the budget for University Extension, with the remainder coming from contracts, grants, and other University funds).

Beyond these educational contributions to California's human capital, the University has assumed primary responsibility among California's public colleges and universities for scholarly research. During 1981-82, it received $551.4 million for this purpose (plus an additional $1,165 million for its energy laboratories), only 20.3 percent of which came from the State's General Fund. Besides the technological breakthroughs in computers, chemicals, pharmaceuticals, and the biomedical sciences that have stemmed from its research, and that have contributed to California's prosperity, several areas of University research warrant specific mention:

Microelectronics: Faculty and students at the Berkeley campus have been deeply involved in this field since 1962, and the campuses at Davis, Irvine, Los Angeles, San Diego, and Santa Barbara have also made major contributions in the fields of computer architecture and computer design. The annual growth rate in this field is about 20 percent, much of it due to the presence of indigenous research facilities within the University. Partially in recognition of this capacity, the State funded the University's Microelectronics Innovation and Computer Research Opportunities (MICRO) program in 1981.

Biotechnology: In the field of recombinant DNA or gene splicing, the University already holds five patents with Stanford, and up to 50 more are expected in the near future. Inventions already refined or soon to be in production include the synthetic production of insulin and interferon, food stuffs, hybrid plant strains with unique resistances to drought or pestilence, and organisms that can digest oil and aid in the mining of nickel.

Agriculture: In no other area of its research has the University seen clearer social and economic results. Through its Agricultural Experiment Station, diseases of both plants and animals have been controlled, productivity in a host of crops and animals has been enhanced, and mechanization has vastly increased harvests. California's wine industry owes much to University research, including the control of Pierce's disease, which had wiped out one hundred thousand

acres of California vineyards in previous epidemics. The Scripps Institute of Oceanography and the University's Cooperative Extension Program are also cited for a large number of contributions to food production and California's economic welfare.

Earthquake Safety: Research reports developed at Berkeley's Earthquake Engineering Research Center are sent to structural engineering firms throughout the State, providing them with the latest innovations in building design, as well as analyses of the potential performance of new equipment in the event of seismic disturbances.

Energy: Major efforts have been conducted for years at UCLA and the Lawrence Livermore Laboratory to develop fusion power. Smaller programs are also underway at Berkeley, Davis, Irvine, and San Diego. Scientists on six campuses are working under the University-wide Energy Research Group and the California Energy Studies Program on energy conservation in California buildings, the State's electrical power system, and energy policies, energy supply resources, and energy technologies affecting the State.

The University's report on its economic impact takes note of the evidence regarding the relationship between research and productivity. For example, Edwin Mansfield has found that investment in long-term basic research returned profits at an average rate of 56 percent above cost for 17 recent manufacturing innovations by reducing costs, improving product quality, or increasing the profits of users. A study of technology-oriented agricultural research between 1927 and 1971 indicated that this research yielded a rate of return of over 90 percent above cost through such improvements as hybrid strains of plants, improved animal nutrition, and more efficient mechanization (Evenson, Waggoner, and Ruttan, 1979, pp. 1101-1107). Similarly, Thomas Marshak has found that the economic benefits from research conducted at Berkeley on integrated circuits, earthquake engineering, catalysis and catalytic conversion, and food processing have all been many times greater than their direct costs.

CALIFORNIA COMMUNITY COLLEGES

California's 106 Community Colleges provide substantial benefits to industry through trained human resources -- particularly to smaller firms that may not be able to afford their own training. They offer nearly 4,000 occupational programs at the certificate and associate-degree level, covering more than 400 individual occupational categories and including such newly emerging specialties as laser technology, robotics, computer-assisted design, and geological technology. In addition, they offer occupational courses for meeting relicensure and continuing education requirements for various professions, and more than half of them have cooperatively developed employee training through contracts with more than 2,500 firms, including General Motors, Pacific Telephone, Hewlett-Packard, Apple Computers, Rockwell International, Rohr, Bechtel, and Sperry Univac.

The Chancellor's Office report on the economic impact of the colleges discusses a number of their unique programs designed to serve people with special needs resulting from economic displacement, training for new and emerging occupations, and compensatory education. Among them are the following:

- The California Worksite Education and Training Act is a cooperative training program between the colleges and businesses to provide various skills. It consisted of 117 projects and involved 11,333 students between 1979 and 1982.
- The San Francisco Registered Nurse Project involves 1,150 trainees for acute care and convalescent hospitals in the San Francisco area.
- The San Mateo Electronics Project is training over 5,000 participants as electronic assemblers and technicians.
- The Southern California Computer-Aided Design Project, a cooperative effort of four southern California colleges, involves some 100 trainees.
- The Century Freeway Project involves some 2,500 people in learning pre-employment skills in preparation for building trade apprenticeships.
- The Yuba County Farmworker Project II involves 450 seasonal farmworkers who are learning welding and mechanical trades to permit them to be employed during winter months.
- The Firefighters Project is training 192 women and minorities for five fire departments in Contra Costa, Kern, and Sacramento Counties.
- Bilingual teacher training programs in 35 Community Colleges are preparing students to become teacher aides or transfer to four-year institutions in order to help the more than 400,000 persons in California who are either limited- or non-English speaking.

• The Displaced Workers Program involves 27 projects to train former workers such as those from the closed Fremont General Motors Plant in such fields as electronics, computer maintenance, robot repair, computer-assisted design, and laser technology.

• Refugee Students Programs were helping 41,448 students in 1981. During 1980, 2,595 students were placed in jobs with a projected annual income of $28 million, thereby reducing unemployment and welfare benefits by about $7 million. In the future, the Community Colleges will be the primary agency for the training of refugees in English and various job skills, and the resulting reductions in public assistance payments will largely offset the training costs.

• Apprenticeship programs registered and approved by the State Department of Industrial Relations are currently offered by 44 colleges in cooperation with business and industry and are serving some 35,000 students who are learning operating engineering, surveying, plumbing, and electronics, among other skills, in on-the-job settings.

• Cooperative work experience programs offered 15,779 students job training during 1981-82 at a variety of businesses, where they earned $11.4 million while also attending college classes during off hours.

INDEPENDENT COLLEGES AND UNIVERSITIES

In 1981-82, the 60 member institutions of the Association of Independent California Colleges and Universities awarded 24 percent of the State's bachelor's degrees, 50 percent of the master's degrees, 47 percent of the doctorates, and 72 percent of the professional degrees. As a result of their particular emphasis on doctoral and professional programs, in terms of their size, they have a disproportionate influence on high-level skills development in California as well as nationally and internationally. For example, out of the 471 degrees that the California Institute of Technology awarded in 1980-81, 129 -- over a fourth -- were doctorates. At Stanford, 771 of the 3,035 degrees it awarded that year were either doctorates or first professional degrees, as were 908 of the 6,037 awarded by the University of Southern California.

The research activities of the State's independent universities that have contributed to California's economic prosperity include aeronautical, astronautical, and astrophysical studies at Caltech that have accounted in large part for California's prominence in the aerospace industry. The electronics research pioneered during the 1930s by Stanford's Frederick Terman, and the encouragement he extended to William Hewlett and David Packard, among others, to apply their findings to scientific manufacturing, certainly led to the development of California's "Silicon Valley" that now surrounds Stanford.

California's independent universities have also pioneered continuing education in the professions through electronic media. Thus at Stanford in 1953, Terman inaugurated the Engineering Honors Cooperative program, which now allows professionals in hundreds of California corporations to enroll as part-time graduate students and attend class via cable television.

RETURNS ON GOVERNMENT INVESTMENT IN HUMAN CAPITAL

The fact that college graduates earn more than those with less schooling is well known. As an illustration of this difference, Table 12 shows the lifetime income of American men in terms of their education as of 1972, as reported by the National Center for Education Statistics (NCES). The difference between workers with less than eight years of schooling and those with more than five years of college averaged $543,762.

Unfortunately, NCES did not report comparable data for women, but they did include a table which compared median incomes for both men and women in 1979. Those data indicated that while women's median incomes were substantially lower than men's, the income improvement produced by advanced education was even more favorable to women than to men. For example, men with four years of college had a median income that was 42.6 percent higher than that for men with a high school diploma. For women, the percentage was 105.3 percent. Thus, although the median incomes were $21,538 and $9,928 for men and women college graduates in 1979, respectively, it appears that a college education was even more valuable to women than it was to men.

Another illustration of this difference was developed by Professor Alex Cassuto of California State University, Hayward. In the State University's report on its economic impact, he offered percentage differentials or ratios of income among both male and female workers with different levels of education. Table 13 reproduces

TABLE 12 Lifetime Income of American Men by Years of School Completed, 1972

Years of School Completed	Lifetime Income
Less than Eight Years	$279,997
Eight Years	343,730
One to Three Years of High School	389,208
Four Years of High School	478,873
One to Three Years of College	543,435
Four Years of College	710,569
Five or More Years of College	823,759

Source: National Center for Education Statistics, 1982, p. 190

his findings, based on 1979 Bureau of the Census data for American men. The data for women show comparable figures except that, as with the NCES data, higher education appears to improve women's incomes even more than men's. As an example, men between the ages of 25 and 34 show income improvements of between 5 and 38 percent with a college degree above what they would have received with lesser amounts of education. Women show improvements of between 19 and 71 percent.

These ratios indicate not only that additional education produces additional income, but also that the differential increases in almost every case with time. What may be less evident from such data on the economic benefits of higher education to individuals is its benefit to government through increased taxes. Table 14 on page 20 shows how much more federal and State income taxes State University students at various levels are likely to pay over their lifetimes than high school graduates, based on 1979 earning potential. It also shows how much these students' education cost the State of California.

As can be seen, men with bachelor's or higher degrees are estimated to repay the entire cost of their education in incrementally higher federal and State income taxes. For example, men with bachelor's degrees are likely to pay $19,143 more in income taxes over their lifetimes than high school graduates, but the cost of their college education to the State over the four years was only $13,008. Men will repay the State some 28 percent of its investment through their State income taxes. Women return less than men, but the amounts they do return are still substantially greater than they would have been without higher education. Because California income taxes accounted for only 36 percent of California's 1979-80 General Fund budget, while sales and other consumer taxes accounted for another 36 percent, it is safe to assume that if these other taxes are counted, male recipients of State University baccalaureates will return to the State more than half of its investment in

TABLE 13 Income Ratios of Males Based on Differing Levels of Educational Attainment, 1979

Educational Level	Age of Worker			
	25 - 34	35 - 44	45 - 54	55 - 64
One to Three Years of College Compared to a High School Graduate	1.05	1.12	1.14	1.23
Four Years of College Compared to a High School Graduate	1.21	1.49	1.56	1.68
Five or More Years of College Compared to a High School Graduate	1.38	1.72	1.77	1.90
Four Years of College Compared to Three or Fewer Years of College	1.15	1.33	1.36	1.37
Five or More Years of College Compared to Three or Fewer Years	1.31	1.48	1.55	1.55
Five or More Years of College Compared to Four Years	1.13	1.15	1.13	1.13

Source: Adapted from California State University, 1983, p. II - 24

their degrees through their payment of additional State taxes over their lifetimes. Women return less because their incomes tend to be lower, but they still must be considered as major contributors to their own education. In summary, the State University's economic impact report presents a convincing case that State tax revenues from the increased income of college and university alumni, combined with those generated by institutional operations, make California's colleges and universities more than self-supporting, even before taking into account their intangible contributions to cultural and social life -- the subject of the next chapter.

CONCLUSION

The Center for the Continuing Study of the California Economy has noted the importance of higher education to California's economic prosperity in its 1982 report to the State Department of Economic and Business Development on "California's Technological Future." It has also warned of a current danger to higher education and other State services that may affect the State's continued economic well-being. One of its comments is particularly relevant to this chapter on the role of California higher education in human capital development (p. 38):

"Job growth in California does not occur automatically. California has grown faster than the nation because the State has been an attractive location for new industry. Past growth has placed California in a good position to share in the kind of growth that is projected to occur in the nation during the 1980s.

"California must continually maintain those institutions and amenities that contribute to the State's attractiveness. Two issues related to California's attractiveness in the 1980s are receiving attention now throughout the State. One is the future of support for governmental functions ranging from the university system to local parks to highway maintenance and construction. The other is the impact of housing prices and supply on the possibilities for job growth. There is a wide range of opinion on how these issues should be faced in the 1980s. However, there is a growing consensus that failure on either issue would negatively affect both the prospects for growth and the quality of life for existing residents."

TABLE 14 California State University Costs of Instruction of Students at Various Levels, and Estimated Extra Income Taxes Paid by These Students During Their Lifetimes Above Those of High School Graduates, Based on 1979-80 Costs and Tax Rates [1]

Years of College Completed	Cost of Instruction to the State	Extra Taxes	
		Men	Women
Three Years of College	$ 5,588		
Federal Income Taxes		$ 4,446	$ 2,889
State Income Taxes [2]		1,278	206
Total Additional Income Taxes		$ 5,274	$ 3,095
Four Years of College	$13,008		
Federal Income Taxes		$15,428	$ 5,323
State Income Taxes [2]		3,715	661
Total Additional Income Taxes		$19,143	$ 5,984
Five and One-Half Years of College [3]	$22,835		
Federal Income Taxes		$18,157	$12,303
State Income Taxes [2]		5,438	2,407
Total Additional Income Taxes		$23,595	$14,710

1. All amounts are for extra taxes paid above those of high school graduates.
2. Figures assume no outmigration from the State
3. Based on one and one-half years of graduate study.

Source: Adapted from California State University, 1983, p. II-38

CHAPTER THREE

Higher Education's Impact on Personal and Social Development

IN 1851, Herbert Spencer wrote that "education has for its object the formation of character." Many educators and laymen both then and now would agree. In addition to the services education provides in helping people become more employable and more skilled in their work, it can also help them become better people and better citizens. These personal and social effects are not easily quantifiable, but any analysis of the economic impact of California's colleges and universities must deal with them -- not only because it would be a mistake to believe that if something can't be measured, it doesn't exist, but also because of the massive benefits that accrue to California's economy through the impact of higher education on individual personality and social life.

EFFECTS ON INDIVIDUALS

Scholars of human capital sometimes point to its significance for economic growth without attempting to explain why education produces this growth. The reasons include not only the development of students' skills but also their knowledge, attitudes, and habits -- in Spencer's word, their character. The economist Fritz Machlup noted this fact in his 1970 study, *Education and Economic Growth*, where he identified such effects as these (pp. 7-8):

> (a) better working habits and discipline, increased labor efforts, and greater reliability; (b) better health through more wholesome and sanitary ways of living; (c) . . .better comprehension of working requirements...; (d) prompter adaptability to momentary changes, especially in jobs which require quick evaluation of new information and, in general, fast reactions; and (e) increased capability to move into more productive occupations when opportunities arise.

These personality characteristics may in the long run have as much influence as job skills in making graduates employable and in keeping their rate of unemployment lower than that of workers with less schooling. As is well known, unemployment declines as education increases. Table 15 below illustrates this fact by showing unemployment rates for workers of different levels of schooling at four points during the past 20 years.

Education helps people learn how to learn, makes them better able to gain new skills quickly, and helps them adjust more easily to change. This influence affects not merely individual life; by making people more self sufficient, it has social benefits of reducing crime and the need for public assistance.

TABLE 15 Unemployment Rates for the Civilian Labor Force 18 Years Old and Over by Educational Level, 1965, 1970, 1975, and 1980

Educational Attainment	Percent Unemployed			
	1965	1970	1975	1980
Less than Four Years of High School	6.2%	5.4%	12.7%	9.9%
Four Years of High School	4.1	3.9	9.1	6.5
One to Three Years of College	3.3	3.9	6.9	4.9
Four or More Years of College	1.4	1.5	2.0	2.0

Source: National Center for Education Statistics, p. 216.

In the most thorough analysis of research on the impacts of education yet published, *Investment in Learning* (1977), Howard Bowen of the Claremont Graduate School quotes Kenneth Keniston and Michael Gerson about some of the other psychological effects of higher education (p. 275):

> College attendance tends to increase open-mindedness, a perspectival view of truth, the individualization of moral judgments, psychological autonomy and independence; it decreases dogmatism, authoritarianism, intolerance, conformity, [and] conventionalism. . . .

After reviewing the existing psychological literature, Bowen observed that higher education also tends to produce an openness to change, a greater involvement in public affairs, a heightened sense of humane values and social responsibility, new ideas with technological and organizational benefits, and greater international understanding. Moreover, he commented (pp. 274-275):

> The style of life, the tastes, and the behavior patterns of college-educated people may be diffused to some extent throughout society through imitation or emulation. For example, college-educated people tend to have smaller families than other groups, to pay greater attention to the nurturance of children, to be less prone to violent crime, to be more efficient in coping with personal affairs and problems, to be healthier, to be more discriminating in consumer choice, etc. To the extent that others emulate their life patterns, the influence of college education may be transmitted to others. Further, the presence of college-educated people in the society may contribute toward graciousness of living and ease of social intercourse. It also may stimulate cultivation of the arts and learning and make feasible the publication of cultural magazines and books and the establishment of widely accessible cultural institutions, such as museums, libraries, symphony orchestras, and opera companies, all of which require a considerable scale of operation for economic feasibility.

Perhaps most important for an open and pluralistic society such as America's, education serves as one of the major routes to individual advancement and success, allowing talent and determination to rise despite the constraints of family, locality, and class. Economists label this major sorting-and-sifting role of education as "redistribution of income," by which taxpayers and contributors to student aid programs (including fee-paying University and State University students) and college endowments subsidize the education of financially needy students. Apart from the obvious benefits of schooling in increasing the circulation of talent, the opportunity for continued education remains America's major means of reducing economic and social unrest.

This role of higher education in California is exemplified most clearly by open admissions at Community Colleges and the extensive financial aid programs of California's public and independent four-year colleges and universities. Full-time Community College students, for example, are particularly likely to come from low-income families, and Community Colleges seek to serve not only financially disadvantaged students but the physically and psychologically handicapped. Currently, they offer a wide range of instructional and support services for some 49,000 students with handicaps, including special learning skills programs, readers for the visually impaired, and even wheelchair repair and loan.

Beyond students who enroll in California's colleges and universities, these institutions serve non-students through a variety of means. For example, during 1981-82, the University of California granted library access to 40,167 persons not affiliated with it, allowing them use of its combined collections of 19 million books, serials, manuscripts, maps, microfilms, documents, and recordings. Virtually every institution offers cultural programs of music, dance, theater, film, and lectures as well as attendance at intramural and intercollegiate athletic events. Many maintain museums, art galleries, and exhibit areas; and increasing numbers are expanding their public information services through publications and on-campus programs for adults such as alumni colleges and Elderhostel. Among independent institutions, Caltech counted 230,000 visitors to its campus, laboratories, and observatories during 1981-82; the University of Southern California accommodated 390,000; and Stanford welcomed 500,000. The most recent figures of California State University campuses (1978-79) indicate some 2.8 million visitors during the year; and the Community Colleges calculated the participants in their community service programs that year as millions more (Table 16).

TABLE 16 Community Service Programs with Participation Rates in the California Community Colleges, 1978-79

Type of Program	Number of Participants
Courses and Workshops	505,664
Spectators and Participants in Recreational Programs	3,415,818
Users of College Facilities Under Civic Center Act	5,122,324
Participants in Cultural and Lecture Programs	1,555,744
Community Development Programs	573,349
Other Programs	257,535

Source: Chancellor's Office, California Community Colleges, 1983, p. 35.

The University of California identifies its most important intangible benefit to the State as its ability to attract talent to California and to develop the talent already here. In their own way, all of California's colleges and universities share this wide-ranging developmental goal.

EFFECTS ON SOCIAL LIFE

California's institutions affect the common good not only through their educational impact on individual students and visitors but also through their research and service activities. Their scientific research has produced substantial improvements in the quality of life for Californians and people everywhere, their contributions to humanistic and social thought have affected how people view themselves and the world; and their medical, public health, and community service activities have improved the physical and social well-being of their localities and regions. Indeed, it seems likely that colleges and universities may have as much influence on public values, attitudes, and perceptions of what is real and good as any other institution in society, including the church, government, and the mass media.

The impact of California's university research programs is well known. As mentioned above, it ranges from increased understanding of the extent and evolution of the universe, as revealed by observatories at Mounts Hamilton, Wilson, and Palomar, to the discovery of the internal structure of elementary particles through cyclotrons, bevatrons, and linear accelerators. Less widely appreciated may be their health and community service programs. For example, the University of California operates not only five major teaching hospitals but two neuropsychiatric institutes, a veterinary teaching hospital, and a variety of medical, dental, and optometric clinics that provide diagnosis and treatment at cost. Stanford's medical center admits 25,000 patients a year from nearby communities as well as from around the nation and the world, but it also treats the same number of patients in its emergency facilities and serves 130,000 more through out-patient care. And on most campuses, whether public or independent, two-year or graduate level, students and faculty participate informally in outreach programs to schools, hospitals, nursing and retirement homes, libraries, parks, playgrounds, jails, and prisons. As community service volunteers in suicide-prevention centers and drug-overdose hot lines, and as interns in child-care centers and school counseling centers, thousands of California college and university students are helping repay the State for its investment in them.

CONCLUSION

One hundred and seven years ago, the third president of the University of California, Daniel Coit Gilman, was offered the inaugural presidency of America's first graduate-level university, Johns Hopkins. In leaving Berkeley for Baltimore to create a new type of educational institution for America's rapidly expanding society, he phrased the goals of America's colleges and universities in sweeping terms (1898, p. 13):

> less misery among the poor, less ignorance in schools, less bigotry in religion, less suffering in the hospitals, less fraud in business, less folly in politics,... more study of nature, more love of art, more lessons from history, more security in property, more health in cities, more virtue in the country, more wisdom in legislation....

Even if California's colleges and universities have not yet achieved all that Gilman hoped of them in terms of social betterment or that Herbert Spencer expected in terms of the formation of character, they continue to seek the improvement of California life and character; and this effort has innumerable if uncounted economic benefits.

CHAPTER FOUR

Summary and Conclusions

"SOAP and education are not as sudden as a massacre," Mark Twain once quipped, "but they are more deadly in the long run." Soap aside, most Californians would agree with Twain that education does have long-run impacts, even if they are seldom physically deadly. Californians probably also believe with de Tocqueville that ignorance can often have fatal consequences, that "the diffusion of knowledge must necessarily be advantageous," and, with Ann Landers, that ultimately, ignorance is more expensive than education.

Their belief seems to be justified by the evidence presented in the preceding chapters about the impact of higher education on California's economy. The directly measurable influences of California's campuses as financial industries are massive, contributing at least $28.3 billion to California's economy in 1981-82, a figure that represents almost 8 percent of the State's gross economic product. Their function as trainers of highly skilled talent, producers of new knowledge, and contributors to California's cultural life can be only indirectly measured and estimated, but all indications lead to the conclusion that the intangible benefits they provide are even more important economically than the measurable ones.

Increasingly, it is clear that California's economy cannot function without highly educated manpower and continued technological advances, and that higher education is a major source of this talent and innovation. At the same time, it is equally clear that California colleges and universities cannot function without a sound economy to support them, for only a prosperous economy produces the resources that make academic pursuits possible. Those facts lead to the need for an even greater symbiosis among academic institutions, industry, and government, both in California and nationally, to sustain their mutual economic benefits.

The introduction to this report raised five questions concerning these economic benefits. In light of the previous chapters -- and additionally as a means of summarizing the evidence -- it now seems possible to offer some answers.

1. *If exposure to education produces changes in people, how can these changes be characterized?*

Concerning changes in people, Chapter Three presented a substantial amount of evidence which indicated that many beneficial changes do occur. Howard Bowen summarized them best when he indicated that higher education tends to make people more open to change, more flexible in their thinking, less prejudiced toward others, and more cognizant of humane values and social responsibilities. By successfully completing curricula which demand attention to detail and personal discipline, they tend to carry that discipline into their careers and lifestyles later. Many of the personal attributes which make for success in life may be formed prior to admission to a campus, but the campus experiences tend to refine them further, solidify them, and make them habitual.

2. *Are those who spend a period of years on a campus people who would have succeeded anyway?*

Undoubtedly, many of them would have to some degree. There can be no question but that many intelligent and talented people have become successful without receiving collegiate degrees. What higher education does appear to do is to increase everyone's chances for success, in part because a degree represents a credential universally recognized by employers as an indication of accomplishment, but more importantly in the long run because college and university experiences form habits of success that persist for life. All of the data on unemployment rates and lifetime earnings indicate clearly that any exposure to higher education benefits the individual, regardless of whether that person's talents are meager or exceptional. Whatever level of success a person might have expected without advanced education, that level is increased with it in the vast majority of cases.

3. *Are the research contributions of the professoriate only the result of the higher education complex, or would they have emerged*

eventually from corporate research laboratories anyway?

There is no simple answer to this question. In the past few decades, most large corporations have maintained research facilities, some of them not unlike university research laboratories. Many useful inventions have emerged from them, and a number of industrial researchers have even been awarded Nobel prizes for their work. Because corporate laboratories are increasing in scope and financing, it may be tempting to wonder if the billions of dollars invested in university research, most of it in "basic" or "pure" research which may or may not pay economic dividends later, could not be spent more wisely in areas where applications seem more likely to be produced.

That thought ignores several salient facts about the nature of research. On the one hand, corporate research laboratories would not and could not exist without university research efforts. The vast majority of corporate researchers, if not all of them, are university graduates whose research skills were developed and refined on campuses. The leaders of private laboratories are often doctorate holders, and they were able to earn their advanced degrees through exposure to basic research problems and to faculty with broad experience in nonapplied research fields. Further, basic research, however nebulous its purposes may seem, often and usually feeds into applied fields. The discovery of DNA and RNA came from basic research efforts into the mysteries of the cell, and led eventually to corporations specializing in the creation of new and beneficial plants and pharmaceuticals. Similarly, the silicon chip can also trace its discovery to mountains of basic research in the fields of physics and electronics. Many of the discoveries which made the space program possible would not have been available were it not for pure research efforts in the chemistry of hydrocarbons, the physics of metals and ceramics, and human biology itself. In the social sciences, the natural sciences, and the humanities, explorations into the past have taught us more about ourselves, about our place in the universe, about our cultural traditions, about our psychology, and about the nature of civilization. All of it, however seemingly obscure it may be, increases our fund of knowledge, and that must lead eventually to a more rational and productive existence.

4. *Are students receiving subsidized training that they would have sought at their own cost if public higher education did not exist?*

This question must be answered relativistically. Surely, many students do pay far more for their educations in private and independent schools, colleges, and universities than do students in publicly supported institutions. Just as surely, the number of students with the ability to pay is far fewer than the number capable of benefiting from the experience. It was on this fact that the tuition-free principle of the University of California was established in the 1800s and extended subsequently to the other segments. That policy appears to be changing in the face of economic pressures, but it remains true that public subsidies continue to provide opportunities to students who would not otherwise have had those opportunities, and who will go on to make their own contributions to society after acquiring their educations. As many commentators have observed, California's attractiveness to business and industry is partially the result of both the quality and the quantity of its educational system. Without the public segments, much of that quality might still exist within the independent segment, but the quantity of trained manpower available certainly would not.

5. *Finally, would California with all its natural advantages of geography and climate be as prosperous as it is with a far lower expenditure on education?*

This question is often phrased, "Wouldn't business and industry find this state sufficiently attractive to locate here anyway?" The answer seems to be that in all probability, some would; but a strong correlation exists between economic prosperity and educational expenditures. In general, those states with the strongest economies are also the ones with the best developed educational systems and the most extensive social, transportation, and cultural facilities and programs. As noted in Chapter Two, many economic researchers have argued that there is a direct relationship between the strength of the educational system and corporate location decisions. While industrial leaders may take wage and tax rates, transportation costs, energy prices, land and housing costs, and lifestyle amenities into account when considering the location of a new facility, they are also vitally concerned with the availability of a large and well-trained labor force.

Recently, California lost a major research facility, the Microelectronics and Computer Technology Corporation (MCC) laboratory, to Austin, Texas. The director of the MCC project, Bobby Inman -- former deputy director of the CIA and a retired admiral -- indicated that the selection committee had doubts about California's "long-term commitment to higher education." The perception of that commitment by outsiders may or may not be accurate, but it is clear that educational programs and facilities are a major concern of corporate leaders. The desire to spend somewhat less on the educational system may, if the data contained in this report are even approximately accurate, be the worst kind of false economy.

None of these comments should be interpreted as conveying the suggestion that California should initiate massive new spending for higher education. All requests for funds for direct institutional support or for student financial aid must obviously be scrutinized closely by the appropriate authorities. What is meant here, however, is the fact that resources devoted to higher education over the past century have paid enormous dividends to California and its citizens. It is not an overstatement to observe that all of the money appropriated by the State has been returned to it in the form of tax revenues paid by higher education's institutional employees, by those who owe their jobs to higher education's presence, and by its graduates and the corporations which employ them.

In his analysis of the evidence about the impact of colleges and universities on American society, Howard Bowen reached this conclusion (1977, p. 448):

> First, the monetary returns from higher education alone are probably sufficient to offset all the costs. Second, the nonmonetary returns are several times as valuable as the monetary returns. And third, the total returns from higher education in all its aspects exceed the cost by several times. In short, the cumulative evidence leaves no doubt that American higher education is well worth what it costs.

Nothing in the evidence of California's investment in its colleges and universities leads to a different conclusion for this State. Investments in education are a large part of the reason why California has been able to create the most vibrant and productive economy in the history of humankind. In all probability, it is also this same investment that has given Californians -- and all Americans -- the freedom to enjoy it.

APPENDIX

Other Studies of Higher Education's Economic Impact

AS noted in Chapter One, dozens of studies of the economic impact of higher education have been produced in recent years by various agencies around the country. In style and form, they have been extremely diverse -- some dealing with local communities and others with multi-state regions; some concentrating on specific issues, such as the impact of student spending, and others dealing with particular segments of higher education, such as independent colleges and universities. Most have been based on econometric modeling techniques, but a few have opted for narrative with little empirical data. All have attempted to demonstrate not only that higher education has important economic consequences but that both the economic and social welfare of the nation are more dependent on educational institutions than many might suppose.

This appendix summarizes twelve of these studies, with particular attention to two major ones -- those in Pennsylvania and New England.

THE PENNSYLVANIA STUDY

In November 1981, the Pennsylvania State Board of Education and the Pennsylvania Higher Education Assistance Agency released a report by the Pennsylvania Economy League, Inc., entitled *Higher Education and the Economy: A Survey of the Impacts on Pennsylvania's Economy of its Colleges and Universities*. The report relied both on a personal survey of each of the state's 100 public and private institutions and on numerous studies from federal agencies for national comparisons to Pennsylvania. It attempted to measure 29 economic impacts of Pennsylvania's colleges and universities in five categories: those of (1) the institution as a consumer; (2) the institution as an employer; (3) the institution as an investor; (4) the institution as a property owner; and (5) other factors, including such issues as in- and out-of-state expenditures, the provision of community services, and various details of capital expenditures and tax payments.

To estimate the total impact of college and university funds flowing into the economy, the Pennsylvania Economy League used what appears to be a very conservative multiplier of 1.69 -- a figure derived in part from the fact that only about three-fourths of Pennsylvania's payroll was estimated to be spent within the state. The impacts derived from the study are shown in Table 17 on page 30.

Other sections of the Pennsylvania report discuss social benefits, human capital development, and personal changes in individuals resulting from their collegiate experiences. None of these discussions is quantified, however, other than to show income differentials among persons with varying levels of educational achievement. Nevertheless the report concludes that the costs involved in supporting the educational enterprise are well worth it.

THE NEW ENGLAND STUDY

In 1979, the New England Board of Higher Education (NEBHE) created the Commission on Higher Education and the Economy of New England, with the senior vice president and chief economist of the First National Bank of Boston as its chairman. Over the succeeding three years, NEBHE produced three books dealing with various aspects of the relationship between New England higher education and the economies of the six states of the region. Each was co-authored and co-edited by NEBHE's president, John C. Hoy, and Melvin H. Bernstein, its vice president for research and development.

Although the volumes do not contain mathematical modeling typical of other economic impact studies which emerged in the wake of the 1971 Caffrey-Isaacs study, they offer important information on the connections between education and economic development in New England.

Perhaps most accurately, they should be characterized as "futures" reports, in that they attempt to analyze the sources of the region's economic health, the changes of recent years which have compromised that health, and the actions that should be taken to restore it. They note that 260 colleges and universities are located in the six-state New England region -- twice as many on a per-capita basis as the nation as a whole -- and argue that these institutions play both a di-

TABLE 17 The Economic Impact of Higher Education in Pennsylvania, 1979-80

Subject Category	Numerical Category
Impact of the Institution as a Consumer:	Dollar Impact
Institutional Expenditures	$ 814,449,503
Faculty and Staff Expenditures	1,074,231,930
Student Expenditures	367,516,143
Direct Support Employees	4,469,016
Subtotal	$2,260,666,592
Plus Multiplier (1.69)	1,559,859,948
Total Impact	$3,820,526,540
Impact of the Institution as an Employer:	Number of Employees
Institutional Employment	101,973
Direct Support Employees	583
Employment Multiplier (additional jobs created throughout the economy)	74,876
Total Impact	177,432
Impact of the Institution as an Investor:	Dollar Impact
Deposits in financial institutions by collegiate institutions, their full-time employees, students, and related businesses.	$1,139,815,738
Impact of the Institution as a Property Owner:	Dollar Impact
Collegiate Institutional Ownership of Land, Buildings, and Equipment	$4,277,051,972
Endowments	1,039,985,527
Business-Related Real Property and Inventory (which would not exist but for institutions of higher education)	2,386,083,739
Total Impact	$7,703,121,238

Source: Adapted from Pennsylvania Economy League, 1981, p. 5.

rect and indirect role in fostering economic growth beyond being among the region's largest employers in their own right.

The first volume, *Business and Academics: Partners in New England's Economic Renewal*, contains seven chapters on various aspects of the relationship between academic institutions in New England and the business community. They note that because public higher education depends on tax revenues for support, if business is unhealthy, tax moneys are reduced, which results in less support for state-supported campuses as well as fewer student-aid funds for independent institutions. Accordingly, the region's colleges and universities have a direct interest in the overall health of its economy.

The chapters also argue that the future prosperity of the region depends very heavily on the direct involvement of colleges and universities in its economic development and that business leaders need to communicate with leaders of higher education regarding labor force requirements and research products, particularly in technological areas. If business and education representatives are not communicating, mismatches can occur in these areas, and economic production can suffer.

The second volume, *New England's Vital Resource: The Labor Force*, concentrates heavily on the emerging high-technology industries of the region and the need of those industries for technologically educated labor. Its seven chap-

ters cover such topics as changes in demographic trends, particularly with regard to population growth and average age and educational level and differences between academicians and business leaders regarding long-term versus short-term views of labor-force changes.

Despite the fact that New England's academic sector "is not only holding its own in turning out the graduates needed for a high technology economy, but it is also ahead of the nation overall" (p. 9), the book expresses concern over competition from the southern sunbelt states, warning that the consequences of high-technology industrial loss could be extremely severe for New England. It notes that New England's technological progress of the nineteenth century was realized with only minor contributions from the academic community, which then eschewed "vocationalism" in all its forms. Today, it argues, the region can no longer afford the luxury of such detachment. Economic life is too interdependent: business relies too much on technology to ignore the academy, and the academy is too dependent on business productivity to ignore it for long without damage. It states that between 1975 and 1980, high-technology industries accounted for 21 percent of New England's increase in employment, and that when the service sectors, including banking, insurance, health, and education, are added, the total rises to 40 percent -- an increase that would not have occurred without university-trained people.

Most of the third volume, *Financing Higher Education: The Public Investment*, deals with human capital development and financial strategies for supporting higher education in New England in the future. Its final chapter contains 19 recommendations from the NEBHE Commission, including the following:

1. A greater concern by higher education for the quality of secondary education.
2. Direct involvement by higher education institutions in the teacher certification process, particularly in mathematical and technological fields, one which will ensure a continuing supply of qualified teachers.
3. A periodic review of high school curricula by the leaders of major New England corporations, especially in fields related to business and industry.
4. Direct involvement by business and industry in the teaching of mathematics and science.
5. A strengthening of vocational education with an emphasis on "hands-on" experience in actual work settings.
6. Development of "work scholarship" contracts at colleges and universities whereby a corporation would support a student while in school in return for that student's going to work for the company later.
7. Cooperative arrangements whereby colleges and universities could use state-of-the-art equipment during off hours in various firms.
8. Better planning efforts to ensure a continuing flow of needed graduates to the business and industrial sectors.
9. Greater support from the private sector in the form of "challenge grants" from foundations that would be matched by corporations.
10. The use of corporate employees as part-time faculty in fields where there is a shortage of regular faculty.
11. Contracts between universities and business firms for in-house training of employees.

The remaining recommendations are designed to improve economic opportunities in New England and people's perception of New England as a region of opportunity, including a campaign to attract certain industries, particularly in high technology fields, to the area.

OTHER ECONOMIC IMPACT STUDIES

The following ten studies are more limited in scope than either those in Pennsylvania or New England, but each offers a perspective on the economic importance of educational institutions.

The Economic Impact of the Louisiana State University System on the Louisiana Economy (Sheldon Engler and others, Association for Institutional Research Forum Paper, 1980). This brief study delved heavily into econometrics, particularly with regard to the derivation of a multiplier. It concluded that for every dollar spent by the Louisiana State system, another $0.72 (i.e., a multiplier of 1.72) of income was generated within the larger economy .

The Economic Impact of Mohawk Valley Community College upon Oneida County (Stephen Sotherden and others, Mohawk Valley Community College, Utica, New York, 1978). Also heavily devoted to econometrics, this study showed the sources of revenue and the categories

of expenditure for Mohawk Valley Community College in New York State, which had a total 1977-78 budget of $9.9 million. Based on the Caffrey-Isaacs models and using a multiplier of 1.8, the study indicated that the college's total impact on the Oneida County community in 1977 was $34.5 million.

St. Cloud State University's Impact on the Local Economy (Mark D. Lange, St. Cloud State University, 1980). Also based on the Caffrey-Isaacs models, this Minnesota study used multipliers in the range of 2.0 to 2.2 and measured such factors as local spending by faculty and staff, business property committed to university-related spending, unrealized local business volume, university-related state aid revenues, and impacts on local government revenues, local employment, local income, and interindustry employment. The report does not offer an overall conclusion as to the value of St. Cloud State to the community, but it is clear that the university generates a very large share of the economic life of the area.

Impact of the University of Virginia on Charlottesville and Albemarle County (Eleanor G. May and Margo E. Hauck, University of Virginia, 1981). Developed through a modification of the Caffrey-Isaacs models and including estimates of the cultural, social, and recreational value of the University of Virginia, this study concludes that the institution is the area's largest employer and that it accounts for over $300 million in business volume.

The Economic Impact of Independent Higher Education in New York State (Diane Gay and Floyd Weintraub, Commission on Independent Colleges and Universities of the State of New York, 1978). This study did not make extensive use of econometrics but as an alternative developed a number of aggregated figures relating to institutional revenues and expenditures. It compared job totals in a number of industries, indicated federal money attracted, and estimated the impact of student spending. To determine the overall effect on the economy, it employed a multiplier of 2.0, and with this it estimated the impact of student spending at $3.8 billion in 1977-78. Adding institutional spending, the total impact of New York State's independent colleges and universities reached $7.9 billion that year.

Study of the Economic Impact of Six Community Colleges in Illinois (Raymond Bess and others, Illinois Community College Board, Springfield, 1980). This study also employed the Caffrey-Isaacs models and estimated such factors as college-related local business volume, expansion of the credit base, the cost of public school and other municipal services allocable to college-related influences, the number of jobs generated by the presence of the colleges, and other factors. Multipliers in the range of 2.5 to 3.6 were used to estimate total community impact of the six colleges at about $1 billion.

Georgia State University Spending Patterns and the Atlanta Economy, 1978 (Charles D. Salley, Georgia State University Office of Institutional Research Report No. 79-8, Altanta, 1979) This relatively general study employed part of the Caffrey-Isaacs methodology and a multiplier of 1.48 to estimate the total economic impact of Georgia State at $140.2 million during the 1977-78 fiscal year.

Economic Impact of the Metropolitan Community Colleges on the Kansas City Region (Sherry Manning, Midwest Research Institute, Kansas City, 1975). This study also employed part of the Caffrey-Isaacs methodology, but attempted as well to evaluate the colleges' human capital production in the four-county Kansas City area. It noted that the three college campuses involved had physical assets of $35 million as of 1975 and an operating budget of $14 million per year. It estimated the total impact of the colleges at $38.4 million, including both direct and indirect expenditures.

Study of the Economic Impact of Spending by Students in Arizona Universities (Arthur B. Ashton and Robert A. Huff, Arizona Board of Regents, Phoenix, 1982). This study, addressing only student spending at three Arizona universities, concluded that these students in 1981-82 spent $334.4 million in direct funds, $122.9 million of which came from out-of-state students, whose spending generated $2.9 million in state taxes and created 4,444 jobs. When both direct and indirect expenditures by the institutions were added, the total student impact reached $856.9 million. This compared to university revenue from state appropriations, tuition, and fees of $254.0 million. The report adds that the dollar impact totals do not include added state wealth generated by the universities' research contributions or from the State's highly educated workforce.

The Economic Impact of Long Beach City College: Fiscal 1981 (William N. Littlefield, Long Beach Community College Foundation, 1982). This study used a modified version of the Caffrey-Isaacs approach to estimate that for every dollar that the college removed from the local economy, it returned $19. As with many other studies of its type, it was concerned with the generation of community business volume, principally in the form of retail sales, and with the creation of jobs and personal income. In addition, it devoted considerable space to a review of unemployment rates, and concluded that the existence of the college has reduced unemployment markedly. It assumed that only $4.7 million of the college's $39 million budget was locally generated, since this was the amount produced by local property taxes, but because the college is a state-supported institution, a great deal more of its support comes from income, sales, and other tax revenues generated by the community it serves. Further, the estimate of the college's total impact of $88.9 million was based largely on estimates of additional income generated by the college's graduates, rather than on directly measurable spending in the community by the college, its students, and the faculty and staff. As noted earlier in the Commission's report, the added income earned as a result of educational experiences represents one of higher education's principal values to the economy, but it does not generally play a role in the direct economic impact of a particular campus on a particular community.

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